

## 6 Faraday's Researches

effect. The beautiful explication of these variations afforded by Cavendish's theory of quantity and intensity requires no support at present, as it is not supposed to be doubted.

18. In consequence of the comparisons that will hereafter arise between wires carrying voltaic and ordinary electricities,, and also because of certain views of the condition of a wire or any other conducting substance connecting the poles of a voltaic apparatus, it will be necessary to give some definite expression of what is called the voltaic current., in contradistinction to any supposed peculiar state of arrangement, not progressive, which the wire or the electricity within it may be supposed to assume. If two voltaic troughs P N, P' N', fig. 2, be symmetrically arranged and insulated, and the ends N P' connected by a wire, over which a magnetic needle is suspended, the wire will exert no effect over the needle; but immediately that the

=V

Fig. 2.

ends P N' are connected by another wire, the needle will be deflected, and will remain so as long as the circuit is complete. Now if the troughs merely act by causing a peculiar arrangement in the wire either of its particles or its electricity, that arrangement constituting its electrical and magnetic state, then the wire N P' should be in a similar state of arrangement before P and N' were connected, to what it is afterwards, and should have deflected the needle, although less powerfully, perhaps to one-half the extent which would result when the communication is complete throughout. But if the magnetic effects depend upon a current, then it is evident why they could not be produced in any degree before the circuit was complete; because prior to that no current could exist.

19. By *current*, I mean anything progressive, whether it be a fluid of electricity, or two fluids moving in opposite directions, or merely vibrations, or, speaking still more generally, progressive forces. By *arrangement*, I understand a local adjustment of particles, or fluids, or forces, not progressive. Many

other reasons might be urged in support of the  
view of a *current*